NASA Facts

National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland 20771

301 286-8955

NF-209 January 1994

NASA's Mission to Planet Earth: Space-Based Missions, 1994-2000

Since its creation in 1958, NASA has been studying the Earth and its changing environment, observing the atmosphere, oceans, land, ice and snow, and their influence on climate and weather.

In 1991, NASA began a global-scale examination of the Earth to study the interaction of all the environmental components—air, water, land, life—that make up the Earth system. The global program, called Mission to Planet Earth, is NASA's long term, coordinated research effort to study the Earth as a global environmental system.

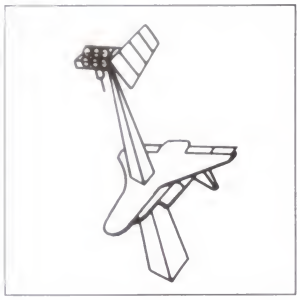
Mission to Planet Earth will use the unique perspective available from space to allow humans to better understand environmental changes and to distinguish between natural change and human-induced changes. Phase I of Mission to Planet Earth comprises free-flying satellites such as NASA's Upper Atmosphere Research Satellite (UARS) and Space Shuttle missions such as the Atmospheric Laboratory for Applications and Science (ATLAS). These space missions are complemented by airborne and ground-based studies.

Phase II of mission to Planet Earth begins in 1998 with the launch of the first Earth Observing System (EOS) satellite. EOS is a series of 17 satellites and supporting ground and data systems that will develop a 15-year environmental data base, focussing on climate change.

The end product of Mission to Planet Earth will be the ability to develop and implement environmental policies based on a better understanding of how our environment works. To develop that understanding, Mission to Planet Earth will depend on EOS Data and Information System (EOSDIS), which will get Mission to Planet Earth data into the hands of scientists who will analyze it and use it to build computer models of the environment. EOSDIS is being developed to archive, manage and distribute data to users worldwide.

Following are the space-based elements of Mission to Planet Earth through the end of the century.

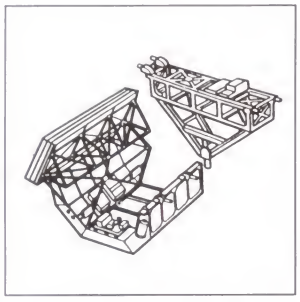
March 1994



Shuttle Solar Backscatter Ultraviolet Experiment (SSBUV):

SSBUV measures ozone concentrations and provides calibrations to check data from NASA and NOAA's free-flying satellite ozone instruments. Space Shuttle mission STS-62 will be the sixth flight of SSBUV.

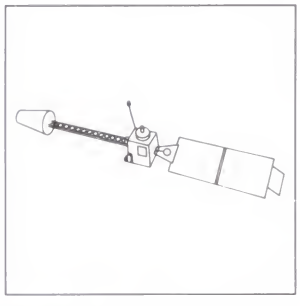
April 1994



Space Radar Laboratory (SRL-1):

Mounted in the Shuttle's cargo bay, the Space Radar Laboratory will study the Earth's surface and atmosphere with two instruments: a U.S.-German-Italian imaging radar called SIR-C/X-SAR and the Measurement of Air Pollution from Space (MAPS). SIR-C/X-SAR will provide radar data on the Earth's land surfaces, oceans, snow and ice cover. It also will demonstrate the sensitivity of advanced radar techniques, including multiple frequencies and polarizations, to different aspects of the environment. MAPS will measure carbon monoxide, a key element in the build up of greenhouse gases in the atmosphere.

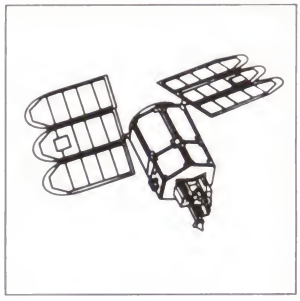
April 1994



Geostationary Operational Environmental Satellite (GOES)-I:

GOES-I is an operational geostationary weather satellite developed and launched by NASA for the National Oceanic and Atmospheric Administration (NOAA). GOES-I will provide atmospheric images, temperature and humidity profiles, wind velocity data and severe storm coverage of Earth's Western Hemisphere. Some GOES-I data will be available to climate change researchers through EOSDIS. GOES-I will be launched aboard an Atlas rocket from Cape Canaveral Air Force Station, Fla.

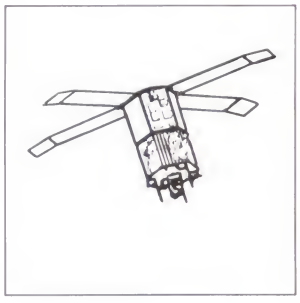
May 1994



Total Ozone Mapping Spectrometer/Earth Probe:

The TOMS/EP will continue one of NASA's most successful environmental programs, extending a 15-year data base of global ozone levels. The TOMS data, along with data from aircraft and ground-based research, have been instrumental in the creation of international agreements to phase out the use of ozone-destroying chemicals in many industries. TOMS/EP will be launched by a Pegasus rocket from Vandenberg Air Force Base, Calif.

July 1994

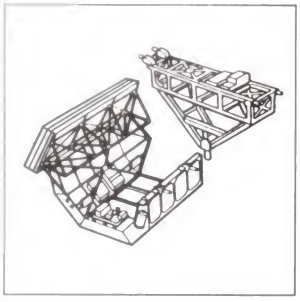


Sea-viewing Wide Field-of-view Sensor (SeaWiFS):

This data-purchase program, extending a data base collected by the Nimbus-7 satellite from 1978-1986, will use commercially provided data to measure concentrations of phytoplankton, microscopic organisms that remove carbon from the Earth's atmosphere. SeaWiFS data will illuminate one of the most poorly understood aspects of climate change, the role of oceans in cycling carbon through the Earth's land, sea and life. SeaWiFS will be the only scientific payload aboard the SeaStar commercial spacecraft, built by Orbital Sciences Corp., Fairfax, Va. It will be launched by OSC aboard a Pegasus rocket from Vandenberg Air Force Base, Calif.

August 1994

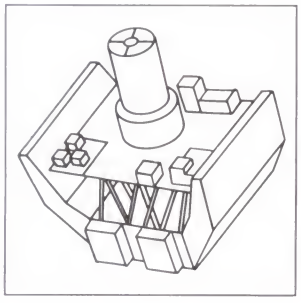
Space Radar Laboratory (SRL-2):



Space Shuttle Mission STS-68 will be the second flight of SRL, aboard the Space Shuttle Atlantis (see SRL-1, April 1994).

September 1994

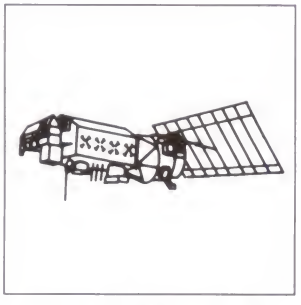
LIDAR In-Space Technology Experiment (LITE):



LITE is a technology demonstration sponsored by NASA's Office of Advanced Concepts and Technology, with some participation from Mission to Planet Earth. Mounted in the Shuttle's cargo bay, LITE will demonstrate the use of Shuttle-based lasers to study atmospheric chemistry, cloud altitudes and profiles, and upper atmospheric temperature and density. STS-64 will carry the LITE experiment aboard the Space Shuttle Discovery.

September 1994

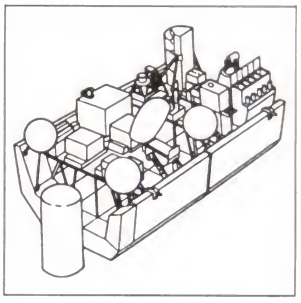
National Oceanic and Atmospheric Administration (NOAA)-J:



A polar-orbiting operational satellite developed and launched by NASA for NOAA, NOAA-J primarily provides information on temperature and humidity in the Earth's atmosphere for weather forecasts. Some data also will be used as part of NASA's Mission to Planet Earth. NOAA-J, a replacement for NOAA-13, which failed in August 1993, will be launched aboard an Atlas rocket from Vandenberg Air Force Base, Calif. (Note: After NOAA-J and GOES-I, dates for NOAA and GOES missions are satellite-readiness dates.

October 1994

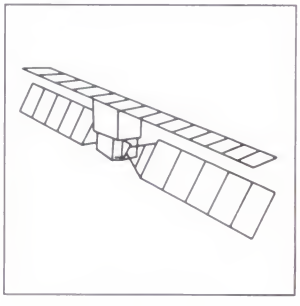
Atmospheric Laboratory for Applications and Science - 3 (ATLAS-3)/ CRISTA-SPAS:



STS-66 will be the third flight of ATLAS, which consists of seven instruments, including SSBUV, dedicated to studying the chemistry of the Earth's atmosphere and the energy output of the Sun. The focus of ATLAS' research is on the processes that create and destroy ozone. The ATLAS instruments, which are precisely calibrated before and after flight, also provide checks on data from several identical or similar instruments flying aboard NASA and NOAA satellites. STS-66 also will be the first flight of the Cryogenic Infrared Spectrometers and Telescopes for the Atmosphere (CRISTA). Developed by DARA, the German space agency, CRISTA will be deployed from the Space Shuttle aboard the SPAS carrier. CRISTA will observe the atmosphere before being retrieved and returned to Earth.

March 1995

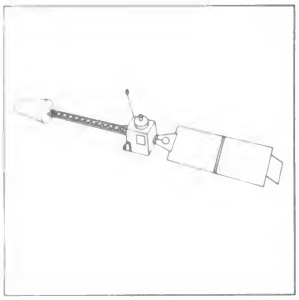
Radar Satellite (RADARSAT):



This joint program between the Canadian Space Agency, NASA and NOAA is designed to provide detailed information on ice cover for climate research and radar imagery for applications in oceanography, agriculture, forestry, hydrology and geology. The satellite also will provide real-time data for Arctic Ocean navigation, including iceberg surveillance, and will make the first full map of the Antarctic ice sheet. Canada will provide the satellite and radar instrument; NASA will provide the launch vehicle, a Delta II, and arrange for launch from Vandenberg Air Force Base, Calif. NASA and NOAA will participate in the data analysis.

April 1995

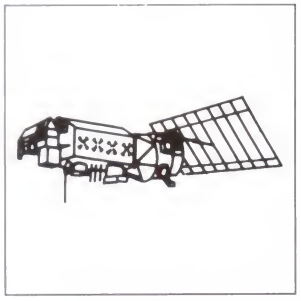
Geostationary Operational Environmental Satellite (GOES)-J:



(See GOES-I, April 1994.)

January 1996

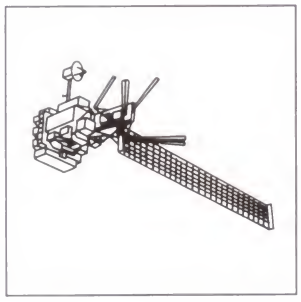
National Oceanic and Atmospheric Administration (NOAA)-K:



NOAA-K will be much like its predecessors but will have more technologically advanced instrumentation. NOAA-K's advanced microwave sounder will be capable of providing observations through all weather conditions. It is scheduled for launch aboard a Titan II rocket from Vandenberg Air Force Base, Calif.

February 1996

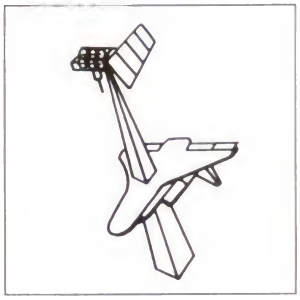
Advanced Earth Observing Satellite (ADEOS)/TOMS/ NASA Scatterometer:



The Japanese ADEOS payload will include two NASA instruments: a TOMS and the NASA Scatterometer, which will observe winds at the sea surface and investigate their importance in climate change. The satellite, scheduled for launch aboard a Japanese H-II vehicle from the Tanegashima Space Center, also will carry instruments to study ocean biology, deforestation and the Earth's energy balance (see also TOMS/EP, July 1994).

March 1996

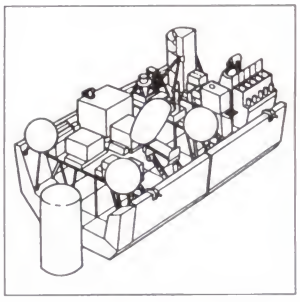
SSBUV:



(See SSBUV, March 1994.)

March 1997

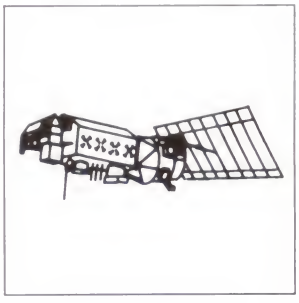
CRISTA-SPAS:



(See ATLAS-3/ CRISTA-SPAS, October 1994.)

May 1997

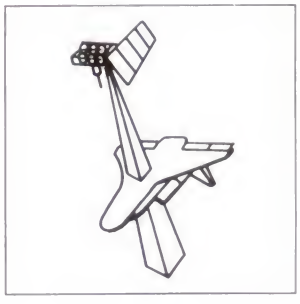
National Oceanic and Atmospheric Administration (NOAA)-L:



(See NOAA-K, January 1996.)

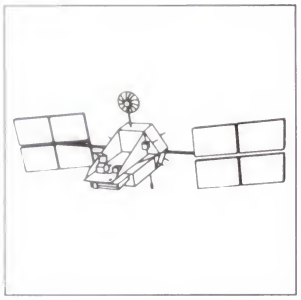
July 1997

SSBUV:



(See SSBUV, March 1994.)

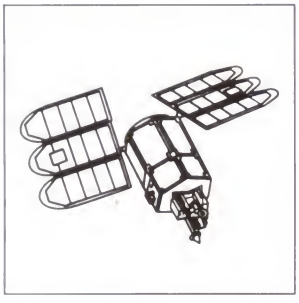
August 1997



Tropical Rainfall Measuring Mission (TRMM):

A U.S.-Japanese mission, TRMM is the first mission dedicated to measuring tropical and subtropical rainfall. Tropical rainfall comprises more than two-thirds of global rainfall and is the primary distributor of heat through the atmosphere. Understanding rainfall and how it varies is crucial to understanding and predicting global climate change. NASA will provide the observatory, four instruments, integration and test of the observatory and will operate the satellite. Japan will provide the Precipitation Radar and launch on an H-II rocket from the Tanegashima Space Center.

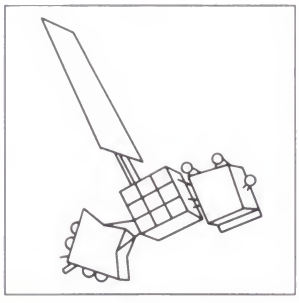
January 1998



TOMS/EP-98:

The fifth TOMS instrument to study global ozone levels. The spacecraft and launch vehicle configurations had not been determined by January 1994 (see TOMS/EP, May 1994).

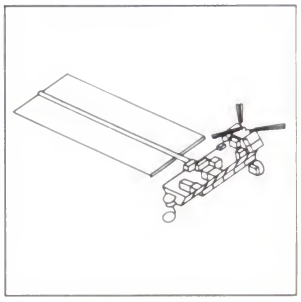
March 1998



Landsat-7 Satellite:

The seventh in the series of Landsat satellites is designed to provide scientists with critical data about the Earth's land surfaces, geological features and vegetation cover. In early 1994, the exact design and management structure of the program was still under consideration by the Office of Science and Technology Policy, NASA and other federal agencies.

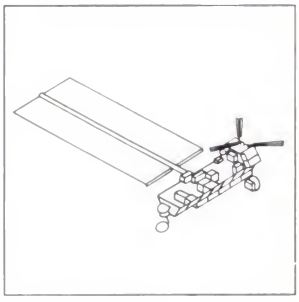
June 1998



Earth Observing System (EOS)-AM 1:

The first spacecraft in the EOS series will provide detailed measurements of clouds, atmospheric chemistry and the Earth's energy balance. The satellite, carrying three U.S. instruments and one each from Canada and Japan, also will observe land surfaces and their interaction with the atmosphere. It is scheduled to be launched aboard an intermediate-class launch vehicle from Vandenberg Air Force Base, Calif.

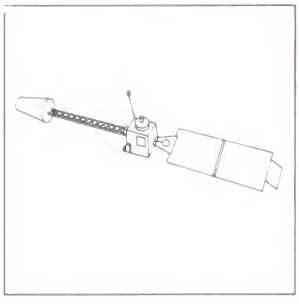
August 1998



EOS-Color:

This data-purchase component of the Earth Observing System will continue the study of the oceans' biological activity and its role in climate change (see SeaWiFS, July 1994).

April 1999

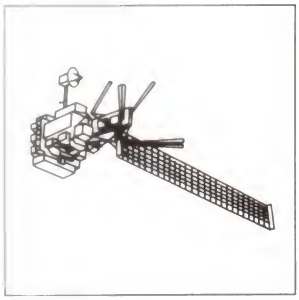


Geostationary Operational Environmental Satellite (GOES)-K:

(See GOES-I, April 1994).

May 1999

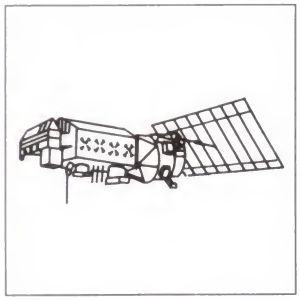
ADEOS II:



This Japanese satellite will carry NASA's SeaWinds instruments, a follow-on to the NASA Scatterometer (see ADEOS, February 1996).

June 1999

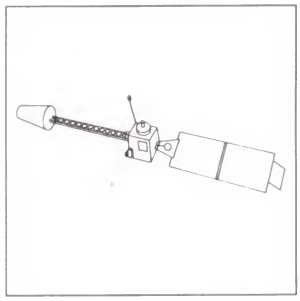
National Oceanic and Atmospheric Administration (NOAA)-M:



(See NOAA-K, January 1996).

April 2000

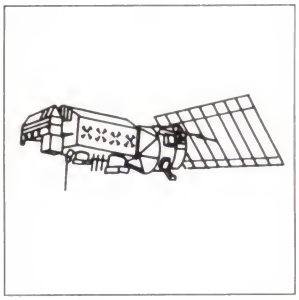
Geostationary Operational Environmental Satellite (GOES)-L:



(See GOES-I, April 1994).

May 2000

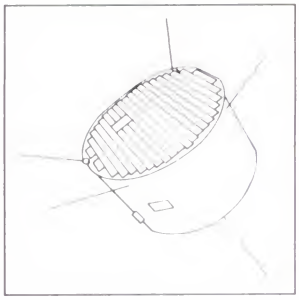
National Oceanic and Atmospheric Administration (NOAA)-N:



(See NOAA-K, January 1996).

July 2000

EOS-Aero:



This element of the EOS program will study aerosols, particles that can enter the atmosphere naturally (e.g., from volcanoes) or from human activity (e.g., the burning for fossil fuels). Changes in aerosol levels can affect global climate and ozone levels.